

CLAIMS

What is claimed is:

1. An electrospray device, comprising:
 - a. a substrate, said substrate having an injection surface and an ejection surface;
 - b. a channel communicating from the injection surface to the ejection surface;
 - c. an entrance orifice located at the injection surface end of the channel;
 - d. an ejection orifice located at the ejection surface end of the channel;
 - e. a recessed region formed in the substrate around the ejection orifice and the ejection end of the channel so as to form a nozzle; and
 - f. a grid plane region around the recessed region, said grid plan region being physically isolated from the nozzle by the recessed region.
2. The device of claim 1, further comprising an electrode overlying at least a portion of the grid plane region, said electrode being electrically isolated from the substrate.
3. The device of claim 1, further comprising a plurality of electrodes electrically isolated from each other and from the substrates, said electrodes overlying portions of the grid plane region.
4. the device of claim 1, wherein the ejection end of the nozzle is at the level of the plane of the ejection surface of the substrate.
5. The device of claim 1, wherein the ejection end of the nozzle is below the level of the plane of the ejection surface of the substrate.
6. The device of claim 1 further comprising an injection device in fluid communication with said entrance orifice.

7. The device of claim 6, wherein said injection device is selected from the group consisting of a capillary, a chip and a micropipette tip.

8. The device of claim 1, further comprising an electrode in contact with fluid to be introduced into the channel in order to apply a voltage to said fluid.

9. The device of claim 8, wherein the electrode is affixed to the substrate in the vicinity of the injection surface.

10. The device of claim 8, wherein the electrode is external of the substrate.

11. The device of claim 1, wherein the injection surface is on one side of the substrate, and the ejection surface is on the opposite side of the substrate, and wherein the channel passes completely through the substrate from the injection surface to the ejection surface.

12. The device of claim 1, wherein the injection surface and the ejection surface are both on the same side of the substrate.

13. The device of claim 1, wherein said nozzle has a cross-sectional area of approximately 50,000 square micrometers or less.

14. The device of claim 1, further comprising a well surrounding the entrance orifice of said channel.

15. The device of claim 1, further comprising an insulating layer provided over the channel surface, the injection surface of the substrate, the ejection surface of the substrate, and the nozzle.

16. The device of claim 15, wherein the substrate comprises silicon and the insulating layer comprises silicon oxide.

17. The device of claim 1, further comprising an insulating layer provided over the recessed region, said insulated recessed region providing electrical isolation between the grid plane region and the nozzle.

18. The device of claim 17, wherein the substrate comprises silicon and the insulating layer comprises silicon oxide.

19. An electrospray device, comprising:

- a. a substrate, said substrate having an injection surface and an ejection surface;
- b. a plurality of channels communicating from the injection surface to the ejection surface;
- c. an entrance orifice located at the injection surface end of each channel;
- d. an ejection orifice located at the ejection surface end of each channel;
- e. a recessed region formed in the substrate around the ejection orifice and the ejection end of each channel so as to form a nozzle; and
- f. a grid plane region associated with each recessed region, said grid plan region being physically and electrically isolated from each nozzle by the respective recessed region.

20. The device of claim 19, wherein the ejection end of the nozzle is at the level of the plane of the ejection surface.

21. The device of claim 19, wherein the ejection end of the nozzle is below the level of the plane of the ejection surface.

22. The device of claim 19, further comprising a plurality of wells on the injection surface of said substrate, each well corresponding to and surrounding the entrance orifice of one of the plurality of channels.

23. The device of claim 19, wherein the plurality of nozzles are positioned in a circular pattern on the ejection surface of the substrate.